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EXAMINER	
FISCHER, MARK L	

ART UNIT	PAPER NUMBER
2627	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/563,457	OAKLEY, WILLIAM S.	
	Examiner	Art Unit	
	MARK FISCHER	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 12-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 12-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 January 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Amendment filed on January 5, 2009. Claims 1 and 6 are currently amended, Claims 2-5 are previously presented, Claims 7-11 are cancelled, and Claims 12-20 are new.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the electronic controller of claims 1 and 5, and the controller of claims 13 and 14 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 1-20 are objected to because of the following informalities: Claim 1 contains many instances where capitalization of letters is misused (for example, claim 1, line 2, "An array" should be changed to --an array--), and these capitalizations should be changed to lower case in a manner similar to that shown in the example. Claims 2-6 and 12-20 also contain similar capitalization informalities which should be corrected. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-5, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hieda et al. (U.S. Pat. No. 6,977,108 B2, hereinafter Hieda) in view of Crewe (U.S. Pat. No. 4,760,567), further in view of Mizasawa et al. (U.S. Pat. No. 5,270,990, hereinafter Mizasawa), furthermore in view of Nickel (U.S. Pub. No. 2003/0007443 A1).

Regarding claim 1, Hieda discloses an array of heads (Fig. 26, elements 231-233), the array including a first head and a second head. Hieda does not explicitly disclose that the heads are carbon nanotube assemblies. However, Crewe discloses a first assembly (Fig. 3) that includes a base (38), a field emission tip (60), a housing mounted (86) on the base, and an acceleration electrode (70) mounted on the housing, and a second assembly (Fig. 3) that includes a base (38), a field emission tip (60), a housing (86) mounted on the base, and an acceleration electrode (70) mounted on the housing; and an electronic controller (Fig. 1, element 27) coupled to the heads of the array of heads to direct emissions of the heads of the array of heads (Col. 8, lines 11-19). While Crewe does disclose the mounting of electrodes (66, 68, 70) on the housing (86), Crewe does not explicitly disclose a tracking electrode. However, Mizasawa discloses the use of a tracking electrode (Fig. 10, elements TCR and TCL) for deflecting an electron beam in the track direction (Col. 4, line 47 to Col. 5, line 32). While Crewe discloses the use of a field emission tip (60) as the source for an electron beam, Crewe does not explicitly disclose the use of a nanotube as the source for an electron beam. However, Nickel discloses the use of nanotubes for electron emission (¶ [0007]) and further discloses the use of a substrate to mount the nanotube (see Fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hieda with Crewe with the motivation to use a well-known type of head in place of the heads disclosed by Hieda to achieve greater

recording density, to combine the teachings of Hieda in view of Crewe with Mizasawa with the motivation to better control the location accuracy of the electron beam and to perform tracking in a manner better suited for an electron beam, and to combine the teachings of Hieda in view of Crewe further in view of Mizasawa with Nickel with the motivation to use a well-known type of electron source in place of the field emission tip of Crewe.

Regarding claim 2, Hieda discloses that the array of heads includes a read head (231) and a tracking head (232). Since Nickel discloses that the heads may be carbon nanotubes, then the combination of the teachings of Hieda in view of Crewe further in view of Mizasawa furthermore in view of Nickel discloses an array of carbon nanotubes includes a read tube and a tracking tube.

Regarding claim 3, Hieda discloses that the array of heads includes a read head (231) and a write head (233). Since Nickel discloses that the heads may be carbon nanotubes, then the combination of the teachings of Hieda in view of Crewe further in view of Mizasawa furthermore in view of Nickel discloses an array of carbon nanotubes includes a read tube and a write tube.

Regarding claim 4, Hieda discloses that the array of heads includes a write head (233) and a tracking head (232). Since Nickel discloses that the heads may be carbon nanotubes, then the combination of the teachings of Hieda in view of Crewe further in view of Mizasawa furthermore in view of Nickel discloses an array of carbon nanotubes includes a write tube and a tracking tube.

Regarding claim 5, Crewe discloses an electronic controller that controls electrons within heads that emit electron beams (Col. 8, lines 11-19), and Nickel discloses the use of carbon

nanotubes as an electron source (¶ [0007]). The combination of the teachings of Hieda in view of Crewe further in view of Mizasawa furthermore in view of Nickel discloses the electronic controller controls electrons within heads containing the carbon nanotubes.

Regarding claim 15, Hieda discloses that the array of heads (Fig. 26, elements 231-233) further includes a third head. Further, Hieda in view of Crewe, further in view of Mizasawa, furthermore in view of Nickel disclose that the heads of Hieda can be carbon nanotube heads including: a base, a substrate mounted on the base, a carbon nanotube on the substrate, a housing mounted on the base, a tracking electrode mounted on the housing, and an acceleration electrode mounted on the housing, as seen in the rejection of claim 1.

Regarding claim 16, Hieda discloses a read head (231), a write head (233), and a tracking head (232). Thus, Hieda in view of Crewe, further in view of Mizasawa, furthermore in view of Nickel disclose that the array of carbon nanotubes includes a read tube a write tube and a tracking tube, the read tube included in the first carbon nanotube assembly, the write tube included in the second carbon nanotube assembly, and the tracking tube included in the third carbon nanotube assembly.

7. Claims 6, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al. (U.S. Pat. No. 6,738,218 B1, hereinafter Hamada) in view of Crewe, further in view of Mizasawa, furthermore in view of Jin (U.S. Pat. No. 7,068,582 B2), even furthermore in view of Nickel.

Regarding claim 6, Hamada discloses a method of operating a head with a disk having tracks, comprising: locating the head at a desired track at a rough precision (Col. 3, lines 27-29);

determining an offset for a read head based on the desired track (Col. 3, lines 34-38); tracking the track through the read head using the offset (Col. 3, lines 59-62 and Col. 4, lines 5-8); feeding back an indication of a location of the desired track at a fine precision (Col. 5, lines 28-31); adjusting the offset responsive to the feeding back (Col. 5, lines 28-31); adjusting a target of the head responsive to the feeding back (obvious because method disclosed by Hamada is for positioning head); wherein the head is a read head (Col. 3, lines 30-37); tracking occurs based on signals received from a detector (10); and adjusting the target occurs through operation of a tracking element (5). Hamada does not explicitly disclose that the head is a carbon nanotube head. However, Crewe discloses a head (Fig. 3) that includes a base (38), a field emission tip (60), a housing mounted (86) on the base, and an acceleration electrode (70) mounted on the housing. While Crewe does disclose the mounting of electrodes (66, 68, 70) on the housing (86), Crewe does not explicitly disclose a tracking electrode and a detection electrode. However, Mizasawa discloses the use of a tracking electrode (Fig. 10, elements TCR and TCL) for deflecting an electron beam in the track direction (Col. 4, line 47 to Col. 5, line 32). Also, Jin discloses a detection electrode (Fig. 3, element 31). While Crewe discloses the use of a field emission tip (60) as the source for an electron beam, Crewe does not explicitly disclose the use of a nanotube as the source for an electron beam. However, Nickel discloses the use of nanotubes for electron emission (¶ [0007]) and further discloses the use of a substrate to mount the nanotube (see Fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hamada with Crewe with the motivation to use a well-known type of reading head in place of the reading head of Hamada so that the reading head of Crewe can be positioned precisely using the methods of Hamada, to

combine the teachings of Hamada in view of Crewe with Mizasawa with the motivation to better control the location accuracy of the electron beam and to perform tracking in a manner better suited for an electron beam, to combine the teachings of Hamada in view of Crewe further in view of Mizasawa with Jin with the motivation use a well-known e-beam detection method, and to combine the teachings of Hamada in view of Crewe further in view of Mizasawa furthermore in view of Jin with Nickel with the motivation to use a well-known type of electron source in place of the field emission tip of Crewe.

Regarding claim 12, Hamada discloses that the locating the carbon nanotube head at a desired track at a rough precision occurs through positioning an actuator to which the carbon nanotube head is attached (Col. 3, lines 23-25).

Regarding claim 13, Hamada discloses determining an offset for a read head based on the desired track occurs through operation of a controller (position controller), the controller coupled to the carbon nanotube head (Col. 3, lines 55-62).

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada in view of Crewe, further in view of Mizasawa, furthermore in view of Jin, even furthermore in view of Nickel, and then even furthermore in view of Teo (U.S. Pub. No. 2004/0080859 A1).

Regarding claim 14, Hamada in view of Crewe further in view of Mizasawa furthermore in view of Jin even furthermore in view of Nickel does not explicitly disclose that the controller determines the offset responsive to an angle of the actuator. However, Teo discloses determining the offset responsive to an angle of the actuator (¶ [0039]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hamada

in view of Crewe further in view of Mizasawa furthermore in view of Jin even furthermore in view of Nickel with Teo with the motivation to be able to accurately position a head on a track regardless of the actuator angle.

9. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hieda in view of Crewe, further in view of Mizasawa, furthermore in view of Jin, even furthermore in view of Nickel.

Regarding claim 17, Hieda discloses a disk drive head (Fig. 26) including a read head (231) and a write head (233), wherein the read head and the write head are offset responsive to signals from the detection of the read head (Col. 14, lines 21-28). Hieda does not explicitly disclose that the read head includes a base, a substrate mounted on the base, a carbon nanotube on the substrate, a housing mounted on the base, a tracking electrode mounted on the housing, an acceleration electrode mounted on the housing, a detection electrode mounted on the housing; and that the write head includes: a base, a substrate mounted on the base, a carbon nanotube on the substrate, a housing mounted on the base, a tracking electrode mounted on the housing, an acceleration electrode mounted on the housing. However, Crewe discloses a heads (Fig. 3) that include a base (38), a field emission tip (60) a housing mounted (86) on the base, an acceleration electrode (70) mounted on the housing. While Crewe does disclose the mounting of electrodes (66, 68, 70) on the housing (86), Crewe does not explicitly disclose a tracking electrode and a detection electrode. However, Mizasawa discloses the use of a tracking electrode (Fig. 10, elements TCR and TCL) for deflecting an electron beam in the track direction (Col. 4, line 47 to Col. 5, line 32). Also, Jin discloses a detection electrode (Fig. 3, element 31). While Crewe

discloses the use of a field emission tip (60) as the source for an electron beam, Crewe does not explicitly disclose the use of a nanotube as the source for an electron beam. However, Nickel discloses the use of nanotubes for electron emission (¶ [0007]) and further discloses the use of a substrate to mount the nanotube (see Fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hieda with Crewe with the motivation to use a well-known type of head in place of the heads disclosed by Hieda to achieve greater recording density, to combine the teachings of Hieda in view of Crewe with Mizasawa with the motivation to better control the location accuracy of the electron beam and to perform tracking in a manner better suited for an electron beam, to combine the teachings of Hieda in view of Crewe further in view of Mizasawa with Jin with the motivation use a well-known e-beam detection method, to combine the teachings of Hieda in view of Crewe further in view of Mizasawa furthermore in view of Jin with Nickel with the motivation to use a well-known type of electron source in place of the field emission tip of Crewe.

Regarding claim 18, Hieda discloses an array of heads, Crewe discloses a field emission tip in the array, and Nickel discloses the use of nanotubes for emission, thus Hieda in view of Crewe further in view of Mizasawa furthermore in view of Jin even furthermore in view of Nickel discloses that the e-beam disk drive head is part of an array of nanotubes.

Regarding claim 19, Hieda discloses that the disk drive head further includes a tracking head (Fig. 26, element 232), and from the rejection of claim 17, it is obvious that the tracking head includes: a base, a substrate mounted on the base, a carbon nanotube on the substrate, a housing mounted on the base, a tracking electrode mounted on the housing, an acceleration electrode mounted on the housing, and a detection electrode mounted on the housing.

Regarding claim 20, Hieda discloses that the head is mounted on an actuator positioned to scan across a rotating surface of a disk (see Fig. 12).

Response to Arguments

10. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK FISCHER whose telephone number is (571) 270-3549. The examiner can normally be reached on Monday-Friday from 9:00AM to 6:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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